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# ASSESSING PRICES FOR COBALT SULPHATE & COBALT CHLORIDE INDUSTRIES

## INTRODUCTION

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Benchmark | Price Assessments strive to create methodologies that accurately reflect the market dynamics of the industries we cover and allow for independent data collection, free of distortion or misrepresentation.

In the cobalt market, we have identified 2 grades that reflect the existing balance of trade and production in the market, a list of which are included in this document( see pg 5).

## PROCESS

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Benchmark price assessments are collected by polling a cross-section of active market participants. Our team of analysts verify and substantiate this information through a range of primary and secondary sources.

This information is reviewed in monthly meetings,

during which our analysts collate all data received and agree on an independent range (high and low) for prices reflective of prevailing market trends. The range that Benchmark sets is reflective of the majority of trustworthy data collected.

If a single price point is published, it will be the mid-point of the high and low range.

Data published at the beginning of each calendar month relates to transactions from the previous month.

As the markets we cover are largely not exchange traded, all pricing data we receive is acquired privately from the market and logged internally.

Benchmark analysts continually seek to increase our pool of price points (contacts). Although the number of contacts for any one price point can vary considerably, the insight and experience of our analysts ensure that all data published can be

authenticated and supported by market intelligence.

If at any time the number of contacts for any one grade falls to a point where data cannot be sufficiently verified, the grade is reviewed by the supervising editor.

Due to the rigid nature of the markets we monitor, price ranges are set on a monthly basis in order to allow for a sufficient number of trades to be completed to reflect a consistent market trend.

# COMPLIANCE & CONFIDENTIALITY

## COMPLIANCE

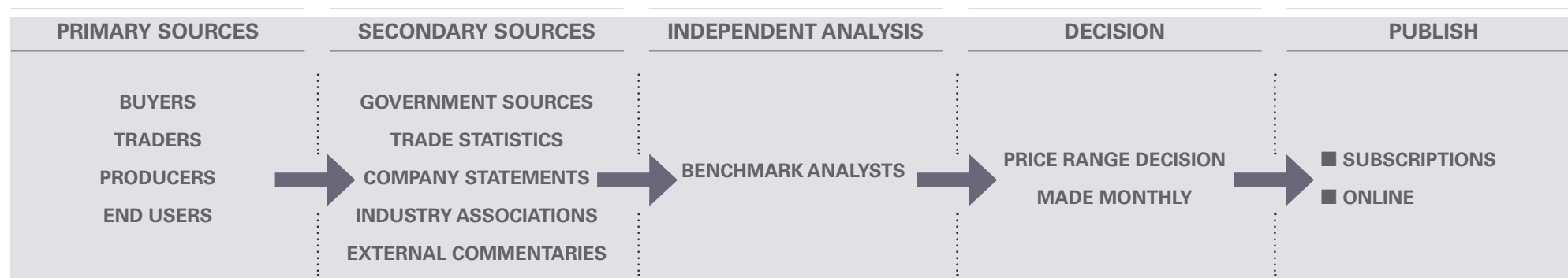
All Benchmark analysts are obligated to sign a code of conduct upon employment in relation to data collection and assessment, to ensure independence and credibility.

## CONFIDENTIALITY

As with all non-exchange traded raw material markets, deals are conducted privately between buyers and sellers.

As such, we treat the confidentiality of all our contacts and data with the utmost seriousness and is subject to Chinese walls within the company in addition to complete confidentiality outside of the company.

## PRICE COLLECTION FLOWCHART



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# TESTING OUR PRICE INTEGRITY

## SOURCE TESTS

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All information received during our data collection process is weighted upon the credibility of the information source.

Benchmark therefore judges the validity of the information received based upon:

- Proximity – the position of the source within the industry and in relation to the transaction being discussed
- Vested interest – the motivation of the source in discussing the information
- Track record – the previous reliability of information obtained from the source
- Date received – when the information was shared in relation to the date of publishing

## COMPARATIVE METRICS

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Often, the nature of surrounding markets can be used as a point of reference for contract negotiations between buyer and seller. Subsequently these data points are employed as comparative metrics in measuring the state of the market in question. Comparative metrics include:

- Comparison to the price of the same product in another area of the market
- Comparison to a slightly different specification product in the same area of the market
- Comparison to transactions completed for the same product in another relevant time period
- Comparison to the material's feedstock or primary derived product(s)
- Comparison to transactions for different volumes or trade routes

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# THE COBALT GRADES WE COLLECT PRICES ON

## COBALT GRADES

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Benchmark tracks 1 cobalt chemical grade and 1 cobalt metal grade which reflect the bulk of traded material suitable for the battery market. We categorise the grades primarily by end use/where it is consumed. These products are:

### **Cobalt Sulphate (Chinese domestic)**

### **Cobalt battery metal**

- Sherritt briquettes (99.9%)
- Ambatovy briquettes (99.8%)
- Minara briquettes (99.8%)
- Chambishi broken cathode (99.8%)
- CTT broken cathodes (99.9%)

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# HOW IS COBALT TRADED?

## COBALT TRADING

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In 2017 refined cobalt production totalled 97,000 tonnes. These contracts were largely negotiated privately between buyer and seller.

Traditionally, volumes are traded in long-term (12 month) contracts and as a result relatively small quantities are sold on short-term transactions.

Cobalt metal is traded on one exchange - the LME - however this only accounts for a small proportion of

the total market (approximately 580 tonnes listed as of December 2017).

Subsequently, all market data Benchmark obtains is done so confidentially and we set minimum transaction categories to avoid misleading outliers being included in our price ranges.

We also weight the information we receive to give more significance to trades of more meaningful volume.

# WHERE DO WE PUBLISH OUR COBALT PRICES ASSESSMENTS?

## PUBLISHING

Benchmark's cobalt price data is distributed primarily through the Benchmark Price Assessments | Cobalt subscription, however with prior approval some data and information included in this service may also be published in:

- Contracts
- Market consultancy and industry reports
- News articles
- Company financial statements

## SUBSCRIPTION:

Benchmark Price Assessments | Cobalt is a dedicated subscription service which includes:

- Independent market analysis
- Monthly market reviews
- Online price database
- Global production statistics

To subscribe, please contact  
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## Cobalt

Cobalt prices surge on metal tightness

- Cobalt sulphate and battery metal prices both increase nearly 8% on February levels following continued metal tightness, pushing raw material feedstock prices higher
- Glencore and GEM reach three-year supply deal totalling over 50,000 tonnes for the length of the contract; the deal represents around a third of Glencore's forecasted production
- Huayou Cobalt announce plans to expand precursor production in China, targeting 150,000tpa capacity, a 2.5x increase from existing levels
- Better Sourcing Program announces the Better Cobalt Project, an initiative to produce artisanal cobalt to OECD standards and allow it to be tracked through the supply chain; Huayou confirmed as major partner
- President Kabila signs DRC mining code revisions into law, increasing royalties on cobalt mining from 2% to 3.5% as a minimum and potentially up to 10%; government initiates negotiations on project by project basis with miners
- **NEW:** Benchmark is pleased to introduce a new grade to the cobalt price assessment service. The **Cobalt Battery Metal** price will track 5 specific products suitable for use in the battery supply chain. Contact **Benchmark Mineral Intelligence** for more details

## TERMINOLOGY

**Cobalt metal:** Cobalt in its metallic form, the commodity that is traded on the London Metal Exchange (LME) at minimum 99.3% Co purity, high grade metal not traded on the LME is defined as minimum 99.8% Co purity.

**Cobalt concentrate:** A 30% Co concentrate that is derived directly from cobalt containing ores through the mining and primary processing of crushing, grinding and flotation or leaching.

**Cobalt sulphate:** A refined cobalt product which typically contains >20.5% Co and can be used for a number of end markets but will most commonly enter the lithium-ion battery supply chain.

**Cobalt hydroxide:** Cobalt feedstock material generally produced at mine site as part of the primary processing of cobalt ores. Crystalline form of cobalt insoluble in water, typically around 60% cobalt on a dry basis.

**Cobalt salt:** Cobalt in a salt form, commonly crystalline. The most prevalently used cobalt salts for lithium ion batteries are cobalt sulphate and cobalt chloride.

**Cobalt chemical:** This refers to any downstream refined cobalt product that is in a chemical form (non-metallic).

**DRC:** Democratic Republic of the Congo

**Megafactory:** Lithium-ion battery cell production facility with a capacity of greater than 1 GWh per year

**NI:** Prices mentioned in this report are price estimates not price assessments to Benchmark's methodology. Benchmark Mineral Intelligence is developing a methodology for cobalt chemical market price assessments that will be available in this subscription soon

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# OUR ETHICS & COMPLIANCE POLICY

## ETHICS AND COMPLIANCE

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Benchmark operates according to publishing best practices and has a strict ethics policy which applies to all editorial employees.

In order to provide the highest quality information available to our subscribers, editorial employees are not permitted to trade any of the materials we cover and strict policies are in place to document and archive information received which is relevant to our published data.

Furthermore, staff are not permitted to invest in related stocks and have guidelines for interacting with industry sources and accepting gifts

## CORRECTIONS

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If any published data is later found to be inaccurate or incorrect, the market will be immediately notified by an email alert. A correction will be published in the following edition of the monthly market report which will be distributed via email and published on Benchmark's web site.

The correction will also be updated in our online databases.